

Claims

- [c1] An imaging system for use in an exterior or interior of a vehicle, the imaging system comprising:
a camera having an image sensor with an associated optical path and
an infrared filter associated with the image sensor for attenuating infrared radiation;
wherein the infrared filter is movable from a first position, wherein the infrared filter is disposed in the optical path of the image sensor for preventing transmission of the infrared radiation to the image sensor, and a second position, wherein the infrared filter is spaced from the optical path of the image sensor and does not prevent transmission of the infrared radiation to the image sensor.
- [c2] The imaging system according to claim 1, wherein the infrared filter moves as a result of an output of the camera, wherein the output is indicative of light conditions in a viewing area of the camera.
- [c3] The imaging system according to claim 2, wherein the output is a gain determined by an Automatic Gain Control.
- [c4] The imaging system according to claim 2, wherein the output is a value representative of a gain determined by an Automatic Gain Control.

- [c5] The imaging system according to claim 2, wherein the output is an exposure.
- [c6] The imaging system according to claim 2, wherein the output is a white balance.
- [c7] The imaging system according to claim 2, wherein when the output is less than a first threshold, the infrared filter is in the first position, and when the output is greater than a second threshold, the infrared filter is in the second position.
- [c8] The imaging system according to claim 7, wherein the second threshold is greater than the first threshold.
- [c9] The imaging system according to claim 8, wherein the second threshold is twice the first threshold.
- [c10] The imaging system according to claim 1, wherein the infrared filter automatically moves between the first position and the second position as a result of light conditions in a viewing area of the camera.
- [c11] The imaging system according to claim 10 and further comprising a solenoid that moves the infrared filter between the first position and the second position.
- [c12] The imaging system according to claim 1, wherein the infrared filter is manually moved between the first position and the second position.

- [c13] The imaging system according to claim 1, wherein the camera further comprises an infrared filter holder for mounting the infrared filter to the camera.
- [c14] The imaging system according to claim 13, wherein the infrared filter holder pivots relative to the image sensor to move the infrared filter between the first position and the second position.
- [c15] The imaging system according to claim 1, wherein the image sensor comprises a focal length, and the infrared filter has a thickness that does not substantially change the focal length of the image sensor as the infrared filter moves between the first position and the second position.
- [c16] The imaging system according to claim 1 and further comprising a supplemental illumination system comprising at least one light source for providing supplemental illumination to a viewing area of the camera.
- [c17] The imaging system according to claim 14, wherein the at least one light source comprises a light emitting diode.
- [c18] The imaging system according to claim 15, wherein the light emitting diode is an infrared light emitting diode.
- [c19] The imaging system according to claim 15, wherein the light emitting diode is a white light emitting diode.
- [c20] The imaging system according to claim 15, wherein the light

emitting diode is a colored light emitting diode.

- [c21] The imaging system according to claim 16, wherein the vehicle comprises a license plate lightbar, and the supplemental illumination system is mounted to the lightbar.
- [c22] The imaging system according to claim 16, wherein the vehicle comprises a center high mount stop lamp, and the supplemental illumination system is mounted to the center high mount stop lamp.
- [c23] The imaging system according to claim 16, wherein the vehicle comprises at least one tail lamp, and the supplemental illumination system is mounted to the at least one tail lamp.
- [c24] The imaging system according to claim 16, wherein the camera and the supplemental illumination system form a unitary module.
- [c25] The imaging system according to claim 16, wherein the at least one light source is directed rearwardly of the vehicle.
- [c26] The imaging system according to claim 16, wherein the supplemental illumination system is selectively actuatable when the imaging system is activated.
- [c27] The imaging system according to claim 16, wherein the supplemental illumination system is selectively actuatable when the infrared filter is automatically positioned in one of the first position and the second position in accordance with light

conditions in a viewing area of the camera.

- [c28] The imaging system according to claim 1, wherein the image sensor is a complimentary metal oxide semiconductor.
- [c29] The imaging system according to claim 1, wherein the infrared radiation comprises wavelengths between about 700 nm and 1 mm.
- [c30] The imaging system according to claim 1, wherein the infrared radiation comprises near-infrared radiation.
- [c31] An imaging system for use in an exterior or interior of a vehicle, the imaging system comprising:
a camera having an image sensor with an associated optical path and viewing area and
an infrared filter positioned in the optical path of the image sensor for selectively attenuating infrared radiation;
wherein the attenuation of the infrared radiation by the infrared filter is a function of ultraviolet radiation in the viewing area.
- [c32] The imaging system according to claim 31, wherein the infrared filter attenuates the infrared radiation when intensity of the ultraviolet radiation in the viewing area is above a predetermined value and transmits the infrared radiation when the intensity of the ultraviolet radiation in the viewing area is below a predetermined value.

- [c33] The imaging system according to claim 32, wherein the infrared filter comprises a photochromic coating.
- [c34] The imaging system according to claim 33, wherein the photochromic coating is disposed on the image sensor.
- [c35] The imaging system according to claim 33, wherein the camera further comprises a glass element in front of the image sensor.
- [c36] The imaging system according to claim 35, wherein the photochromic coating is disposed on the glass element.
- [c37] The imaging system according to claim 35, wherein the camera further comprises a second glass element laminated to the glass element, and the photochromic coating is disposed on the second glass element.
- [c38] The imaging system according to claim 33, wherein the camera further comprises a camera lens, and the photochromic coating is disposed on the camera lens.
- [c39] The imaging system according to claim 38, wherein the camera lens comprises several lens elements, and the photochromic coating is disposed between adjacent lens elements.
- [c40] The imaging system according to claim 38, wherein the camera lens comprises an outermost lens element, and the photochromic coating is disposed on the outermost lens element.
- [c41] The imaging system according to claim 33 and further comprising

a housing for the camera, wherein the photochromic coating is applied to the housing.

[c42] The imaging system according to claim 41, wherein the housing comprises a housing lens, and the photochromic coating is applied to the housing lens.

[c43] The imaging system according to claim 33 and further comprising a housing for the camera and a glass piece mounted to the housing, wherein the photochromic coating is applied to the glass piece.

[c44] The imaging system according to claim 33, wherein the photochromic coating comprises tungsten hexacarbonyl.

[c45] The imaging system according to claim 31, wherein the infrared radiation comprises wavelengths between about 700 nm and 1 mm.

[c46] The imaging system according to claim 31, wherein the infrared radiation comprises near-infrared radiation.

[c47] An imaging system for use in an exterior or interior of a vehicle, the imaging system comprising:
a camera having an image sensor with an associated optical path and viewing area; and
an infrared filter associated with the image sensor for selectively attenuating infrared radiation;

wherein the infrared filter is automatically responsive to light conditions in the viewing area such that the infrared filter prevents the image sensor from being exposed to infrared radiation when light conditions in the viewing area correspond to daylight conditions and does not prevent the image sensor from being exposed to infrared radiation when the light conditions in the viewing area correspond to low light conditions.

- [c48] The imaging system according to claim 47, wherein the infrared filter is permanently disposed in the optical path.
- [c49] The imaging system according to claim 48, wherein the attenuation of the infrared radiation by the infrared filter is a function of ultraviolet radiation in the viewing area.
- [c50] The imaging system according to claim 49, wherein the infrared filter attenuates the infrared radiation when intensity of the ultraviolet radiation in the viewing area is above a predetermined value characteristic of daylight conditions and transmits the infrared radiation when the intensity of the ultraviolet radiation in the viewing area is below a predetermined value characteristic of low light conditions.
- [c51] The imaging system according to claim 47, wherein the infrared filter is movable from a first position, wherein the infrared filter is disposed in the optical path of the image sensor for preventing transmission of the infrared radiation to the image sensor, and a

second position, wherein the infrared filter is spaced from the optical path of the image sensor and does not prevent transmission of the infrared radiation to the image sensor.

- [c52] The imaging system according to claim 51, wherein the infrared filter moves as a result of an output of the camera, wherein the output is indicative of light conditions in a viewing area of the camera.
- [c53] The imaging system according to claim 52, wherein the output is a gain determined by an Automatic Gain Control.
- [c54] The imaging system according to claim 52, wherein the output is a value representative of a gain determined by an Automatic Gain Control.
- [c55] The imaging system according to claim 52, wherein when the output is less than a first threshold, the infrared filter is in the first position, and when the output is greater than a second threshold, the infrared filter is in the second position.
- [c56] The imaging system according to claim 55, wherein the second threshold is greater than the first threshold.
- [c57] The imaging system according to claim 56, wherein the second threshold is twice the first threshold.
- [c58] The imaging system according to claim 51 and further comprising a supplemental illumination system comprising at least one light

source for providing supplemental illumination to the viewing area of the camera.

[c59] The imaging system according to claim 58, wherein the at least one light source comprises a light emitting diode.

[c60] The imaging system according to claim 59, wherein the supplemental illumination system is selectively actuatable when the imaging system is activated.